

Abstract of DE4220508

The system contains a motion sensitive detector (5) with an optical system, a passive IR detector with several detection ranges and an evaluation circuit. The circuit controls a counter according to the signals received. The counter records the number of persons passing the detector, balancing the number according to the direction of motion of the detected persons. A motion detector produces a further signal when thermal radiation detected in the monitored region changes. A logic circuit receiving the counter and thermal motion detector signals corrects the counter. The counter is zeroed when the balancing process produces a negative count. USE/ADVANTAGE - For monitoring access regions of monitored objects. System automatically corrects for false counting when persons are detected.

Description OF DE4220508

The invention concerns a device in the generic term of the requirement 1 indicated art.

Direction-selective counting and switching mechanisms for counting in different directions moving or moved persons and/or objects is used. They supply additional information, which explanation about the directions of motion of the seized persons and/or objects gives .

After the conditions to the technology is that counts and which determining the direction of moved person/objects realizes as follows so far:

When using light barriers at least in each case two radiation transmitters and receiver are attached at the place which can be supervised. An exact collection of moved object/persons is possible only if they cross these successively.

During the verkehrsueberwachung frequently the loop technology begun. But inductance loops are shifted in all roadways. The high installation costs and the traffic impairments arising during the transfer of the inductance loops are unfavorable.

For pay and direction-moderate seizing of moved objects are also image processing devices suitable. Since these devices take up however the signals of moved and motionless objects, the computational expenditure is very high to the image processing and the devices are therefore relatively expensively .

From the DE-OS 32 25 264 are well-known an infrared movement alarm unit, which switches the lighting on of corridors, passage areas etc. for a given time, if persons move by the erfassungsbereich of the movement alarm unit. The application of this solution for example as light switches in dwellings is not possible, since when occurring a person a room the lighting in it is switched on, this however at expiration of the given time again switches off, if the person in the room is not induced far.

From the DE-OS 38 32 428 a device to the direction-sensitive collection of persons of the kind initially specified well-known, which contains however no

counting device

The moreover is from US-HP of 4,799,243 a system of the kind initially specified with an infrared detector arrangement exhibiting several monitored areas well-known, with a balancing counter in dependence from in opposite directions detected person movements the number of the in error can occur to an area persons present determined

With the well-known systems, if they are used for the counting of the number of in final objects in and outgoing persons, if the persons who can be registered pass closely following each other or next to each other the monitored area. Here it is in particular unfavorable that from it incorrect information and false alarms can result if necessary, if the system concerned is used for building monitoring.

The invention is the basis the task to create a device of the kind initially specified which is during the collection of persons able, false countings independently to correct.

this task by the measures described in the characteristic part of the requirement 1 solved

the invention includes the realization that a collection of the number is particularly surely possible in an object of persons present if beyond a bewegungsrichtungssensitive object or person collection with signal receivers, who only information about changes in the erfassungsbereich contains, additionally movement signals are processed, which were taken up without consideration of the direction of motion.

With the system the according to invention for the collection of persons, are a direction of motion-sensitive counting and switching mechanism intended, consisting of an optics, with a passive infrared detector, which is designed as multi-element sensor, and an evaluation circuit a downstream, which heads for a counting circuit, which the number of persons, who passed the detector on the consequence of the delivered of the signals by the elements, holds. A such device is intended in the zugangsbereich one object which can be supervised, i.e. a building or an area range in all other respects locked. Since the collection takes place in a zugangsbereich the one which can be supervised of the object direction of motion-dependently, persons, who are differentiated the object entered from such, can leave the object. If a counter balances the number of the seized persons as a function of its direction of motion, i.e., the going out from the occurring takes off, then possibly occurred differences can be recognized if the object is deserted, i.e. the resulting number of persons "zero" to be should.

If an additional movement detector intended is, which - related to the persons who can be seized - takes up independently of their direction of motion, thus already, if in its erfassungsbereich extending within the object which can be

supervised a change of the taken up radiant heat occurs itself, then can correction information be received to correct eingetretene possible counting errors over before.

If on the one hand a logical logic circuit is intended, of the an output signal of the counting circuit and the output signal of the movement detector as entrance signals to be supplied and these a first output signal deliver, if with the count "zero" will receive appropriate output signal of the counting circuit from the movement detector an output signal, then can incorrectly to low count values be corrected, since obviously still at least one person is in the object.

If on the other hand the logical logic circuit another (second) output signal delivers, if with one of "zero" from the movement detector no output signal will receive deviating count for a first given period, then points this circumstance on the fact that in the monitored area no persons are more present and the count can to "ZERO" is corrected.

With it a reference basis is given, in order to guarantee that notifications of emergency are only then delivered over unwanted persons entering the object if all entitled persons left the object. Here movements, which are detected in temporal proximity to setting the count to zero, do not become yet when treats notifications of emergency, since in these cases from a false counting must be proceeded if necessary. In this - closer - time intervall detected movements are therefore consulted, in order to correct the count, which records the number of the persons present in the object, if necessary. Only in a larger time interval after a zero setting - or if necessary a correction - of the counter edetektierete movements solve then alarm conditions out.

On the one hand are in such a way reached the fact that the transition to a alarm-secured enterprise can take place sliding only then if is guaranteed that those Personden, which permissible-proves the object entered left this. Here it is assumed that counting errors will form the exception. With an arisen counting error only the Zeitruam, in which an evaluation of a movement does not take place as alarm, extends at short notice - proportionally to the absolute value of a such possible counting error. In each case the transition of the pure counting enterprise, in which the number information for the sake of of persons in an object is determined, is flexible to a monitoring enterprise, in which a penetration forms an alarm condition, and adapts thereby for example to a situation, in in an enterprise still the overtime to be carried out.

The knowledge of the persons at any time in an object is however in emergencies (fire-brigade employments and such a thing.) - particularly in hotels - at any time of interest.

With the system according to invention it is thus possible during the monitoring of business premises and such in favorable way to exclude during kontinuierlicher.

Monitoring of the number of persons counting errors present in a Gebaeuse with the transition to a alarm-secured monitoring. Straight this transition is not to be determined by monitoring persons without personal control of each area belonging to the monitored area. The end of the alarm-secured watch dog time area can however - the assuming that then no persons are in the object, the count reached thus "zero", easily time or manually steered to take place, before the first entitled person enters again the object, since in this case false countings therefore not to be considered to need, because no permissible countings took place.

The solution according to invention leave themselves in favorable way for the control of to energy consumption-end in particular systems of the building engineering to use. In addition it belong for example heating -, air conditioning or lighting mechanisms, which can be adapted in each case area or gebaedeweise in their function to the number of persons working in the areas .

In detail leaves itself the described system in the way to operate favorably that the counting circuit remains at the value "zero", if the balancing furnishes a negative result, since negative number of persons present in the object are not plausible.

If in accordance with another favourable further training the counting circuit by the first output signal of the logical logic circuit around "one" are raised, if this first output signal appears, while the count of the counting circuit is "zero", thereby the circumstance used, that, if in directly a relatively short time intervall following to the zero setting of the counter still another movement is detected in particular by a person in the object which can be supervised from a false counting proceeds and is corrected the count. This leaves itself in particular with objects, the not excessive spatial expansion has (small to middle industrial concerns, authorities with public traffic, schools and such a thing.) in favorable way realize.

During another preferential further training of the invention the counting circuit by the second output signal of the logical logic circuit by a pre-determined small number one decreases accordingly or to "zero" one lowers, if this second output signal appears, during the count the counting circuit more largely than "zero" is.

In this way is it possible, with a relatively simply developed system, in particular for the house monitoring, even if the direction of motion-dependent detectors are not able in each case everyone the detection range passing person as an individual to recognize, what for example with children the case may be, who are carried when passing the detector, then takes place one Correction in a limited period if the count indicates that now all persons must have left the area, whereby it is likewise not necessary the fact that a complete movement monitoring of all areas or the entire terrain takes place, since one permissible-proves there person present occasionally into the range of a movement sensor will turn out

To preferring way thus by the logical logic circuit on an output signal of the movement detector an alarm condition indicating signal delivered, if a given length of time of a first interval timer ran off, which is started with the setting of the count "zero" of the counting circuit, since then is to be assumed none permissible-proves in the area stopping persons is more present. Here can if necessary by additional AND circuit for it provided that an alarm can be released only to certain daily or other periods, if from a further second interval timer steered by date and/or time assigned signal.

Although the movement detector will thus receive to a vorgebenen time intervall occasionally direction-sensitively - however not direction of motion-sensitively - be switched can, insists the possibility, in periods, in which a signalling can take place a purposeful monitoring of certain ranges examine thus for example windows and such on unwanted movements. Then in particular the indicating signal additional information about it can contain an alarm condition, in whatever direction regarding the movement detector the its output signal releasing movement took place.

In particular from advantage is it, if the movement detector forms and by at least one element of the multi-element sensor of the counting circuit is preferably formed a partial circuit of the direction of motion-dependent infrared detector for the control of the counting circuit, since a substantial cost reduction of the system can be obtained in this way.

Further to leave itself initially and/or output signals of the logical logic circuit and/or other circuit parts of the system over power mains from external sending and/or receipt act ions receive and/or to these to convey, so that the system according to invention in favourable way with an existing or too installing power mains, in particular with a so-called "local operating network - (LON)" is combinable, with which also different will transfer the object concerned data concerned according to agreeing pattern, so that a favourable linkage can take place also to that extent.

Here takes place the transmission preferentially according to the specifications of the EIB (European installation bus).

In particular also the results of the count of several counting circuits attached to the power mains, are balanced with one another or supplied the output signals of several direction of motion-sensitive detectors of a counting circuit are assigned to which different zugangsbereichen, can do, so that the common monitoring of several zugangsbereiche with only one system can take place. Several decentralized collection mechanisms with separate counting circuits can co-operate with a center according to the "master Slave" principle. It participates substantial that the central thereby is there relieved by subordinated tasks of analysis and no the respective local counters adapted software must be present.

The number of persons data preferably completely finished as actual "actual values", evaluated by the decentralized collection stations, conveyed to the center.

By the use of pyroelectric detectors exists here the favourable possibility of creating with a collection matrix exhibiting few sensor elements a reliably working direction of motion-dependent detector mechanism. Preferred the solution according to invention consists of a passive infrared detector, which is trained from several pyroelectric elements in form of one or several doppelzeilen, behind a collecting lens, whereby the visual field of the direction-selective counting and switching mechanism before the collecting lens, according to which number, geometry and arrangement of multi-element sensors is divided into several smaller visual fields and the evaluation circuit a counting and/or a shifting process releases, if a signal sequence pointing to the movement of persons and/or objects in the visual field of the direction-selective counting and switching mechanism is present. The multi-element sensors represent photon detectors for the admission of the radiant heat emitted by persons and/or objects. The pyroelectric sensors known are besides economically manufactured and without additional cooling operated.

The preferential use of a collecting lens make possible the focusing of the incident radiant heat on the multi-element sensors and in addition the substantial miniaturization of the device according to invention compared with well-known devices.

By the centric arrangement of a lochblende before the collecting lens become the idea by flat jets and scattered light on the lens as well as total reflexions within the lens.

The visual fields of the direction-selective counting and switching mechanism are avoided favorable-prove in such a manner dimensioned that persons and/or objects which can be detected are seized surely. The signals arising at the multi-element sensors are vestaerkt in the pertinent preamplifiers, digitized in A/D transducers and processed in the evaluation circuit. From the signal sequence different lines of belonging to multi-element sensors the direction of motion the visual field of the direction of motion-selective counting device crossing persons.

The invention is certainly detected preferentially realized by an arrangement, consisting of a pyroelectric chip, with at least one doppelzeile of sensitive elements, a similar signal preprocessing, a digital signal processing to the pattern recognition and an optically illustrating system, for example a collecting lens.

Due to the pyroelectric sensor principle only one movement by objects, if it is connected with a heat contrast. Thus the expiration of a movement of a person with simple means can be pursued. For the pattern recognition running off in a signal processor it is important that the constant background does not supply

detectable signals. Thus the collection of a movement of a person or a moved object is strongly simplified by the suppression of the information about the background in contrast to a conventional video camera. In the invention described here the signal processor has only the signals of moved objects, those over a heat contrast for environment orders in form of a sample sequence to analyze.

Favourable training further of the invention is characterized and/or below together with the description of the preferential execution of the invention on the basis the figures is more near represented in the unteranspruechen. Show:

Fig. 1 a principle representation of an application of the device according to invention in the plan view,

Fig. 2 a block diagram of a favourable remark example of the device according to invention,

Fig. 3 a logical circuit as detail of the block diagram in accordance with Fig. 2,

Fig. 4 a schematic representation of a possible arrangement of the multi-element sensors for the device according to invention,

Fig. 5 a sectional view in principle of the remark example with the pertinent visual fields,

Fig. 6 a further sectional view in principle of the remark example in accordance with Fig. 5, with which the opinion is turned represented around 90 DEG,

Fig. 7 a further favorable arrangement of a remark example of a multi-element sensor in several doppelzeilen,

Fig. 8 a circuit diagram of a remark example of a device according to invention including signal processing as well as

Fig. 9a to D schematic representations itself during the device in accordance with Fig. 8 resulting in input signals

In Fig. 1 area 1 which can be supervised represented in the sketch points an entrance 2 and a window 3 on

In the range of the entrance 2, by which in direction of arrow 4 persons can in and go out, is appropriate a direction of motion-sensitive counting device 5 (which passes its data on to an analysis and a display unit 6 and their erfassungsbereich several sectors covers 7, 8 and 9. The direction of motion-sensitive counting circuit is more near represented in the PCT registration PCT/DE 91/00994. It emits output signals, as soon as a movement in one of the

sectors 7, 8 or 9 is seized and determined from the direction of progressing the movement collection within the sectors 7, 8 and 9 the direction of the movement of a person, so that thereupon it can be decided whether the person enters the area or leaves this .

The analysis and display unit 6 made possible on the one hand the representation up-to-date of the persons existing in the area 1 as well as different notifications of emergency. On the one hand also communication (suggested by the arrow 10) with a local operating network (LON) is possible, for that by the connection 11 is represented and several volume units and also a central control interconnects.

In Fig. the circuit of the analysis and indicator 6 shows 2 represented preferential remark example as block diagram, whereby the direction of motion-dependent counting device 5 in the block diagram in accordance with Fig. 2 is contained (dash-dotted line 5). The output signals one for the collection sectors 7, 8 and 9 of sensitive movement detector 21, which are represented further down more near, emit output signals 22 to 24, if in one of the sectors a movement is seized. These output signals arrive at an evaluation unit 25 for the direction of motion. In this evaluation unit 25 in the sectors the 7 to 9 seized movements converted into two output signals, which with "+" and "-" designation are and in each case a ("+") and from ("")treten a person in and/or from the area indicate. This direction of motion evaluation takes place - as mentioned - via the fact that the temporal consequence of seizing movements in the sectors 7 to 9 in allocation to the direction of progressing that of seizing is understood as crossing the erfassungsbereichs by a person in the respective direction and spent as signal. For this used preferential circuit measures are article of PCT/DE 91/00994 and need here no more not represented.

Further of evaluation circuit 25 signal "movement" delivered, if in any sectors 7 to 9 movement detected, without it on direction, taken up from which movement, or which would arrive direction, in which the movement progresses,

A further output signal is with "direction" designated and then, if only the pre-determined sectors is activated, thus a signal from a vorgebenen direction appears is taken up. While thus the signal "movement" the output signals of all for the erfassungsbereiche 7 to 9 sensitive sensors in a OR linkage contained, one of the signals is selected now and passed on separately. With the selected signal it concerns with the available remark example the signal in the collection sector 9, which comes from the window.

The output signals "+" and "-" 26 and 27 at a counter 28 over or gates, which by the output signals of the or gates 26 and/or, arrives. 27 over an Inkrementier("+") entrance and an Dekrementier("") entrance by the appropriate signals around a unit in his count one up in each case and/or one lowers. The counter cannot fall below the count value 0, accept thus no negative counting conditions. The count

of the counter 28 is passed on as output signal to a display 29 and is there readable. If the count reached 0, over a separate exit "0" one spends and one passes on together with the output signals of the movement evaluation unit 25 to the logic unit 30. This logic unit becomes further down from Fig. 3 in the detail described. It stands over a I/O unit 31 with the LON BUS 11 in connection.

To the signals taken up by the LON BUS belongs a time and calendar information, which are named "time". This information informs about the time of day and/or contains an identification for those times, in which in the area which can be supervised no persons should to be found have, that is for example end of workday or nighttimes as well as holidays and if necessary Saturdays

To the signals transferred to the I/O unit 31 belongs two alerts, from those one with "alarm, int." and another with "alarm, ext." is designated, whereby the designation secondarymentioned points on the fact that it concerns here an alert, which was released by an intruder coming from the outside. The moreover the output signal of the counter 30 arrives likewise at the I/O unit to make over the number of persons in the area which can be supervised also at external place available.

The moreover by the logic circuit of 30 correction signals "+ +" and "- -" is produced, which likewise cause the up and/or reduction of the counter 28 around (and depending upon execution if necessary also several) counting stages. These signals "+ +" and "- -" are for this purpose over the or gates 26 and/or. 27 with the appropriate increment ("+") and/or decrement ("-") Signalen the analysis circuit 25 for the direction of motion linked.

In the block the 30 in accordance with Fig. 2 represented logic circuit is in Fig. 3 in detail shown.

In the top of the circuit is represented the elements, which cause a correction, if with counter in the area 1, which can be supervised in "zero-position", still another movement is recognized. For this the output signal "0" is usually supplied to one as monoflop circuit or with software related realization by a counter realized timing circuit 301, which emits an outer course signal for a given length of time. This output signal arrives at a and gate 302, to which at its further entrance the signal "B" is supplied. Becomes thus within a given time intervall, which by the length of time of the output signal of the monoflop 301 is determined, a movement in a collection sector of the sectors 7 to 10 detects, then this means that in the area a person is, whose going out was not seized. That can have its cause in the fact that for example a child was body near carried when occurring on the arm or in other way and when going out was separately seized, so that despite the count "zero" are still another person in the area, who implements movements, which are registered in one of the erfassungsbereiche 7 to 10 necessarily in some time. That leads to the output signal "+ +" the logic circuit, which thereupon around 1 raises the count. (this correction is not

necessary, if actually all persons already left the area, there the counter 28 in accordance with Fig. not to assume and an additional input signal knows 2 negative values "-" no decrementing to negative numbers of persons would have caused.)

Becomes the moreover in the circuit 30 in accordance with Fig. 3 a logic part intended, which causes that also counting errors are corrected to to high numbers of persons. As example the case should be mentioned, with which a child separately registered when occurring is led out from an adult body near from the area 1 (Fig. 1), which can be supervised. For this the output signal becomes D, which decrementing the counter 28 in Fig. 2 causes, the entrance of a further timing circuit 303 supplied, which emits an output signal for a given length of time, which essentially corresponds to the length of time of the impulses on the entrance impulse, as they are delivered of the Erstzeitgeberschaltung 301. Here it is supervised whether in this given length of time a movement in the area took place. It takes place in the way that by each taken up movement, which is indicated by the input signal "B" a Latch 304 is put back over its resetting entrance "RESET". By the input signal "D", which when putting the payer 28 back in Fig. 2, the Latch appears however is set. Should thus if the watch dog time area, which begins with the last decrementing impulse of the counter 28 and is determined in its length by the timing circuit 303, to be terminated, without a movement in the area was recognized, then signs speak for the fact that no persons are in the area. A differentiator 305 evaluates the ruckflanke of the output signal of the timing circuit 303 and supplies this impulse a AND gate 306, whose is supplied to other entrance the output signal "Q" of the Latches 304. Thus if no movements should be detected, then the counter becomes 28 over the or gate 27 over the in such a way produced output signal "- -" (Fig. 2) lowered around a counting unit. This leads again to an input signal "D", so that the evenly described procedure is so for a long time continued, as the counter 28 did not reach the position "zero" and further no movements by persons in the area which can be supervised is determined.

Reaching the count "zero" by the counter 28 by means of the signal "zero" queried, which is inverted over an inverter 307 and linked with a or gate 308 with the input signal "D", which is supplied to the entrance of the monoflop 303. In this way the count decreases thus continuously, if in the area which can be supervised no movements are determined.

The further in Fig. 3 represented logical logic elements serve for the release of alerts, which are delivered, if additional conditions are fulfilled. Here an alarm condition is first of all produced if at expiration of a given length of time a movement is taken up in the area which can be supervised. This period defined again by the length of time of the output signal of the interval timer 301, which is activated by arriving the counter into the "zero-position". As before represented, to this time the following period defined by the interval timer 301 is used, in order to determine whether in the area despite monitoring and of the outlets still

persons remained unidentified. For these it is to be expected however that they move within the period defined by the interval timer 301. If movements in the area arise only later, then it is assumed these persons provided in other way entrance to the area, and over a and gate 309 the appropriate gating is made. As input signals on the one hand the input signal "B" as indications of the taken place movement, furthermore the input signal "zero" are supplied to this and gate as signs for the zero position of the counter and further by way of an inverter 310 a signal, which represents the expiration of the Zeidauer of the interval timer 301. If these conditions are kept, then over a further and gate 311 the alarm condition "A" is spent, "I" than indications of the penetration of an unwanted person. The announcement of alarm conditions further still affected by an input signal "Z", which will receive the presence of persons in the area which can be supervised over external interval timer means and does not indicate that one period is present, with which normally not to be expected is. With reaching one period, which is indicated by the logical signal "Z", it is guaranteed in addition, by the represented schaltmittel that all persons, who regularly enter the area can also leave these, without an alarm condition is spent.

The direction recognition means to be able into the direction-recognizing counting device to be likewise integrated and of analysis means consist in particular, which evaluate in only one of the sectors evaluated during the direction of motion recognition purposefully at the presence of a movement. Is, as from Fig. 1 evidently - the sector 9 directed toward the window 3. If a movement in this sector is recognized, then an expenditure of the signal "B" (Fig. 2) takes place. This signal becomes during the logical circuit in accordance with Fig. 3 a and gate 312 as well as inverts the and gate 311 supplied. Hence it follows that the output signal of the and gate 309 arrives only then at the exit "AI", if the signal "R" is not present. In the other case will over the and gate 312, to which likewise the output signal of the and gate 309 is supplied by way of the further entrance of the latter, to an exit "AE" and indicates that an alert is present, with which the penetration to a person with a direction code is indicated, i.e. that the announced intruder probably entered the area by the window 3

In Fig. a detector 401 is represented 4 for application in the before-described system. It consists of fifteen mutually multi-element sensors 1,1 to 1.15 arranged in a doppelzeile. Its own visual field is assigned to each multi-element sensor. The individual elements are designed and against each other transferred arranged as pyroelectric sensor elements. Each sensor element seizes a subrange of the visual field and emits a signal, if a change occurs here. In this way immovable objects or persons are already faded out during the collection without electronic additional expenditure. The output signals of the individual sensor elements must be only strengthened and after-processed separately. In addition, geometry and arrangement of the multi-element sensors, substantially from the form and the refractive index of the lens and from the distance of the multi-element sensors intended for the lens

The Fig corresponds to geometry and arrangement of the desired visual fields. 5 and 6 shows the front and side views of the device according to invention with their visual field 404. The collection sectors of the individual sensors are radially arranged. The number of sensors arranged transverse to the depressing direction is thereby selected that the range which can be seized is taken off, depends in such a manner thus on the passage width. In depressing direction against it only few sensors (minimum two) are necessary, since the temporal consequence of the seized changes must be only evaluated here. (preamplifiers, multiplexers, analog/digital transducers and evaluation circuit are not represented and are further down more near described here.)

In the focal level of a halfspherical lens 402 is the detector 401. Before the flat side of the lens a Lochblende 403 is arranged centrically, the flat jets and scattered light of the lens keeps away and the occurrence of total reflexions in the lens prevented. (during here a not represented further execution of the invention an additional interference filter is intended for the reduction of disturbing incident light radiation. in the range of the Lochblende) The entire visual field of the device according to invention, which covers a angle range of 120 DEG parallel to the doppelzeile and a angle range of 16 DEG perpendicularly to the doppelzeile, consists of fifteen small (part) Gesichtsfeldern 4,1 to 4,15, those in each case an opening angle of 8 DEG possesses and is alternating to both sides by the lens center and between the multi-element sensors along the doppelzeile running level arranged.

In Fig. a detector consisting of several multi-element sensors is represented 7 of 407 in form several doppelzeilen, which enclose an area as visual field completely, so that it can be seized whether persons or Ge of towards conditions arrive into the supervised area inside or from this. A such arrangement is for example suitable for the controlling of a light signal plant.

In the Fig. the information flow is represented 8 with a remark example of the device according to invention. The infrared radiation is formed off by one object level 421 by means of a lens 422 on the pyroelectric matrix 423 in the focus level. At the sensitive elements, on which temporally changing radiant heat falls itself, a tension signal develops. After a similar signal reinforcement 24 a multiplexer 425 converts the tension resting against the individual elements into a serial signal sequence. This consequence of similar signals is converted at the A/D transducer 426 into a digitized signal sequence. In the signal processor 427 by means of a software according to original pixel geometry a grey tone sample is then provided. From this sample follows, in which section of the erfassungsbereichs of the object level in a pre-determined time window a movement took place

The taken up grey tone sample, how it is present after appropriate signal processing in digitized form, is in the Fig. 9a to D represented. The samples shown in the Fig. 9a to D were taken up at different times in a time slot pattern,

which is adapted to crossing of an object or a person which can be expected by the erfassungsbereich. Timing is designated by the direction of the arrow t and corresponds to the sequence of the figure designations

The individual sensor elements of the matrix is designated by combinations of letters and numbers. In the memory of the signal processor the samples are put down in according to coded form. The kind of signal processing and storage organization depends thereby on the used type of processor and does not need therefore not more near to be described here, there it from the appropriate system manuals comes out.

After the file of the successive samples in the memory takes place the pattern analysis via the comparison of temporally following each other samples

It is evident that with the representations in accordance with Fig. 9a to D an object of the corner A1 moved into the corner D4. The determination of moved objects after its direction takes place now via the fact that the signal differences in neighbouring fields are compared with one another at successive times in the time slot pattern. Each or acceptance, which takes place compared with a neighbouring element at a later time, is rated as movement of the element toward to the element, with which the change occurred later (for example elements D2/D3 in the Fig. 8a and b). An averaging and a summary for neighbouring sensors take place, in which in temporal neighbourhood changes of signal were determined, so that the collection for the object concerned releases only one registration procedure in an appropriate counter downstream in allocation to the respective direction. If during the representation in accordance with Fig. 8a to 8d different smaller objects are thus seized, a registration takes place in different counters according to the direction of motion. Also an additional classification can take place after the object size.

It is evident the fact that with the solution according to invention by use of pyroelectric sensor elements only changes of signal - thus moved objects - are recognized, while at the same time in the erfassungsbereich resting objects present do not affect signal processing. Thus a large part of disturbing signals is void from the beginning and does not need not in complex way in the context of a debugging to be eliminated.

Due to the sample comparison can thereby the geometrical size, the direction and the number of the moved objects depending upon application purpose be recognized.

The invention is limited their execution toward that managing not indicated preferential remark example. Rather a number of variants is conceivable, which from the represented solution with in principle differently constituted remarks use makes.

In such a way leaves itself in the case of several monitored areas the counts of several counters (according to the counter 28 in Fig. 2) to a common count balance, then concerning the following logic circuit the 30 in accordance with Fig. 3 this counter replaces, i.e. appropriate signal statuses of the "spare counter" form the input signals of the circuit 30. Thus the particulars are requestable zugangsbereiche counts assigned in each case for, so that for example data are available to the question, how much persons were in each case within certain space ranges or however this area by the entrance not to have left, by which they entered it.

Target the absolute number of persons in an area are only supervised, which exhibits several entrances, then are it sufficiently, the appropriate exits of several analysis circuits 25 in each case on additional entrances of the or gates 26 and 27 in Fig. to lead 2.

Claims OF DE4220508 1. Device for the collection of persons with consideration of its direction of motion, with an optics, a passive, several sensor elements exhibiting infrared movement detector (21), and this an evaluation unit downstream (25), which signals delivered on a consequence of the sensor elements a counter (28) heads for, that the number of persons, who passed the detector (21), holds, whereby the collection of the persons taken place in a zugangsbereich (2) of an area (1), and the counter (28) the number of persons dependent on their direction of motion balances, by the fact characterized that a logic unit (30) is intended for the correction of possible false countings, and that into the logic unit (30) the count of the counter (28) and as additional information an direction of motion-independent output signal of an infrared movement detector (21) it is received and that the logic unit (30) spends a correction signal, corrected which over a logical feedback an incorrect count of the counter (28).

2. Device according to requirement 1, by the fact characterized that the counter (28) remains at the value "zero", if the balancing furnishes a negative result.

3. Device after one of the preceding requirements, by the fact characterized that the counter (28) is raised by a first correction signal of the logic unit (30) around "one", if this first output signal appears, while the count of the counter is "zero".

4. Device after one of the preceding requirements, by the fact characterized that that is decreased tough one (28) by a second correction signal of the logic unit (30) by a pre-determined small number or lowered to "zero", if this second output signal appears, while the count of the counter is larger than "zero".

5. Device after one of the preceding requirements by the fact characterized that the logic unit (30) delivers an alarm condition indicating signal on an output signal of the movement detector (21), if a given length of time of a first interval timer ran off, which is started with the setting of the count "zero" of the counting circuit, and

if necessary, if from a further second interval timer steered by date and/or time assigned signal will receive to a vorgebenen time intervall.

6. Device after requirement 5, thereby characterized that the movement detector at least is direction sensitive (21) at the times, at which a signal indicating an alarm condition can be emitted, and which contains an alarm condition indicating signal additional information about it, in which direction regarding the movement detector the its output signal releasing movement took place.

7. Device after one of the preceding requirements, by the fact characterized that the movement detector (21) forms a partial circuit of the infrared detector for the control of the counter (28).

8. Device according to requirement 7, by the fact characterized that a sensor element of the movement detector is formed by at least one element of a multi-element sensor.

9. Device after one of the preceding requirements, by the fact characterized that initially and/or output signals of the logic unit (30) and/or other circuit parts of the system are conveyed over power mains (11) from external sending and/or receipt actions received and/or to these.

10. Device after one of the preceding requirements, by the fact characterized that it concerns with the power mains (11) a local operating network (LON).

11 Device after one of the preceding requirements, by the fact characterized that the results of the count of several counters (28), which different monitored areas are assigned are with one another balanced or the output signals of several are supplied, to different zugangsbereichen of assigning direction of motion-sensitive detectors (21), in particular by way of a logical linkage of or, a common counter.

12. Device after one of the requirements 8 to 11, by the fact characterized that sensor elements of the multi-element sensor in form of one or several doppelzeilen (401; 407) are arranged and the detector behind a collecting lens (402) is intended.

13. Device according to requirement 12, by the fact characterized that in the path of rays before the collecting lens (402) a lochblende (403) is intended.

14. Device after one of the requirements 12 or 13, by the fact characterized that in the path of rays before the collecting lens an interference filter is intended.

15. Device after one of the requirements 12 to 14, by the fact characterized that the collecting lens exists made of plastic.

16. Device after one of the requirements 12 to 15, by the fact characterized that the collecting lens is designed as Fresnel lens.

17. Device after one of the requirements 8 to 16, by the fact characterized that the sensor elements consist of pyroelectric material.

18. Device after one of the requirements 12 to 17, by the fact characterized that two neighbouring sensor elements, which belong to different lines possess a common back electrode.

19. Device after one of the requirements 12 to 18, by the fact characterized that the doppelzeilen (401; 407) forming sensor elements are in such a manner arranged that their erfassungsbereiche enclose a given geometrical range totally or partly.

20 Device after one of the requirements 8 to 19, by the fact characterized that each sensor element exhibits a separate inlet and is electrically separately attached.

21. Device according to requirement 20, by the fact characterized that each sensor element a separate amplifier is downstream.

22. Device according to requirement 21, by the fact characterized that the amplifiers are summarized in an integrated building group.

23. Device after one of the requirements 8 to 22, by the fact characterized that the evaluation circuit emits a direction of motion-dependent counting signal with the temporally shifted occurrence of output signals of essentially neighbouring sensor elements of the multi-element sensor for the registration of passing a person and/or an object.